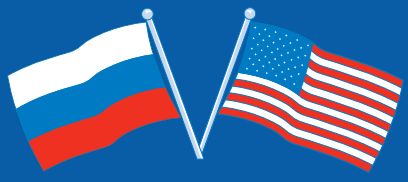
Improving Care for Women Suffering from Pregnancy-Induced Hypertension



Russian Federation - United States of America

2001

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The Health Committee

Access to Quality Health Care

Ministry Of Health
Russian Federation

Central Public Health
Research Institute (CPHRI)

Tver Oblast
Department of Health,
Russian Federation

United States Department of
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The Quality Assurance Project

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QUALITY ASSURANCE PROJECT

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"Access To Quality Health Care" Priority Area

Improving Care for Women Suffering from Pregnancy-Induced Hypertension

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Developed by:

Tver Oblast Health Care Department

Central Public Health Research Institute of

The Ministry of Health of the Russian Federation

Quality Assurance Project - University Research Co., LLC/

Center for Human Services, Bethesda, MD, USA

TVER OBLAST

2001

Preface

The work presented in this clinical guideline was conducted under the US-Russia Joint Commission on Economic and Technological Cooperation, Health Committee, Access to Quality Health Care priority area. The Russian partners in this collaboration included the Ministry of Health, Russian Federation, Central Public Health Research Institute (former MedSocEconomInform), and Tver Health Department. The US partners in this collaboration included the Agency for Health Care Policy and Research. The work was funded by USAID under contract to the Quality Assurance Project, implemented by University Research Corporation/Center for Human Services, Bethesda, MD, USA.

Clinical Problem:	Pregnancy Induced Hypertension (PIH)
Title of the Document:	Clinical Guideline for PIH
Stages of Provision of Medical Care:	Women's consultation clinics Pregnancy complication wards Delivery departments Intensive care wards
Institutions using the protocol:	**Maternity Hospital #1, Tver City** Maternity Hospital and Women's consultation clinic(Vyshny Volochyok) Children's City Hospital (Vyshny Volochyok) Delivery Department with assigned women's consultation clinics (Torzhok)
Project Stage:	**Phase II. Dissemination of Phase I**
Date of Creation:	July 28, 1999
Date of Changes:	2001

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2. Acronyms

BP	Blood Pressure
CNS	Central Nervous System
C-section	Cesarean Section
FHR	Fetal Heart Rate
g	Gram
HR	Heart Rate
I & O	Intake and Output
ICD	International Classification of Diseases
ICU	Intensive Care Unit
IM	Intramuscular
IV	Intravenous
l	Liter
mg	Milligram
mmHg	Millimeters of Mercury
ml	Milliliter
mm	Millimeter
MgSO4	Magnesium Sulfate
NICU	Neonatal Intensive Care Unit
NOS	Not otherwise specified
Ob/gyn	Obstetrician/gynecologist
PIH	Pregnancy Induced Hypertension
RDS	Respiratory Distress Syndrome
RR	Respiratory Rate

3. Definitions

Clonus – series of quick rhythmical muscular contractions at the maximal deep reflex

Corrective positioning – physiotherapy positioning aimed at pathology correction i.e. set of exercises to increase vena cava inferior and uteroplacental blood flow

Creatinine clearance – rate of blood purification from creatinine

Eclampsia – the occurrence of one or more convulsions in a patient with PIH

Fifth Korotkoff sound – the disappearance of sound to determine the diastolic pressure

HELLP syndrome – a microangeopathic hemolytic anaemia syndrome characterized by haemolysis, elevated liver enzyme levels, and low platelet count

Induction of labor – labor is initiated by artificial means, i.e. mechanical, medical or manual

Polypharmacy – simultaneous prescription of many medications

Pre-eclampsia – development of hypertension with proteinuria or edema, or both, due to pregnancy or the influence of a recent pregnancy that manifests during the second part of the pregnancy or the first postpartum week (basically within the first 48 hours).

Pregnancy induced hypertension (Toxemia) – a general term for pregnancy induced conditions characterized by development of hypertension with proteinuria or edema, or both, due to pregnancy or the influence of a recent pregnancy that manifests during the second part of the pregnancy or the first postpartum week (basically within the first 48 hours) and by brain edema and seizures in case of severe forms.

Protective regime (bed rest) – a regime that abolishes physical and psychological stress according to medical indications

Protective regime (semi-bed rest) – a regime that limits physical and psychological stress according to medical indications

Proteinuria – presence of protein in the urine (greater than 300 mg/24 hours)

4. Introduction

4.1. Background

This clinical guideline was developed as part of a demonstration project in Quality Assurance. The clinical guideline describes the clinical and organizational aspects of health care delivery in the system of care for patients with Pregnancy Induced Hypertension (PIH). However, it was neither developed, nor implemented, in isolation from the rest of the quality improvement process, which included:

- Planning the quality improvement project
- Designing the project set-up, including the teams and participating facilities
- Training in quality assurance, development of team skills, and subject matter knowledge in Pregnancy Induced Hypertension
- Developing of an appropriate set of indicators to monitor the project
- Understanding the current system of health care in Pregnancy Induced Hypertension
- Clarifying existing practices in Pregnancy Induced Hypertension
- Developing the updated clinical guideline
- Enhancing the capacity of the system of care to enable the implementation of the updated clinical guideline in Pregnancy Induced Hypertension
- Testing the new system of care for improvement and making further changes as necessary
- Monitoring the indicators of quality throughout the improvement process

It is important to point out that the experience of the authors shows that the development of clinical guidelines on its own does not necessarily lead to improved quality. The entire process of quality improvement allows the guidelines to be developed as well as implemented and tested for improvement. The authors recommend that in applying the clinical guidelines, special attention be paid to issues of adaptation, communication, and implementation in order to increase the chances of successful implementation of the critical guidelines in everyday practice.

The content of the clinical guideline for Pregnancy Induced Hypertension was developed from the best available evidence-based medicine at the time the work was conducted. The clinical guideline was adapted to the organizational, technological, cultural and other factors specific to Tver Oblast.

4.2. Goals for the development and introduction of the Clinical Guideline

One of the major problems that Tver Health Department faces is the diagnosis, management, and treatment of PIH, especially in its severe form. PIH is the major cause of complications, specifically arterial hypertension, pre-eclampsia, and eclampsia, in pregnancy as well as being a contributor to prematurity, and to an increased perinatal morbidity and mortality rate. The large number of hospitalizations, high-priced treatment of severe forms, complicated deliveries, high prematurity, and neonatal rehabilitation make PIH the most expensive complication in obstetrics and neonatalogy. Moreover, it can also be a cause of maternal mortality. As of 1997 cases of PIH in Tver Oblast amounted to 18.1% of all pregnancies and cases of PIH in severe forms totaled 4.3% of all pregnancies; as of the first 6 months of 1998, these percents were 16.3% and 3.2% respectively.

The objective for the clinical guideline development is a new model of PIH diagnosis, treatment and management.

All achievements and failures of the Oblast PIH health care delivery have been thoroughly studied and analyzed jointly by experts and consultants both from Russia and abroad. The clinical guideline is the fundamental principle for all stages of medical care delivery.

4.3. Methodology for the development of the Clinical Guideline

A key requirement of the partners in the collaboration for the clinical guideline was the use of evidence-based medicine as the basis for its development. References, articles, and other sources of information used in the development of the clinical guidelines were screened for the level of evidence supporting them.

Content experts involved in the work were requested to focus especially on the evidence-based content of each resource. The use of evidence-based medicine is particularly relevant to the Russian health care system because of many years of isolation from international medical research. Hence, the Russian Ministry of Health is paying special attention to the dissemination of evidence-based medicine and to its use in clinical practice.

The model for the work was based on Paul Batalden's "Framework for the Continual Improvement of Health Care" [Paul B. Batalden, MD, Patricia K. Stoltz, PA-C, A Framework for the Continual Improvement Knowledge to Test Changes in Daily Work, *Journal of the Joint Commission on Quality Improvement*, October 1993]. This framework suggests the integration of subject matter knowledge with improvement knowledge as a powerful means of continual improvement in health care. The clinical guideline was developed as an integral part of the quality improvement project. The principles of systems approach, teamwork, customer focus and scientific methodology, which were applied to the process of improvement projects, were likewise used in developing the clinical guidelines. Based on this framework and the principles of quality management, Dr. Rashad Massoud of QAP/URC-CHS developed the methodology for clinical guideline development used in this work. The key steps in this methodology consists of the following:

1. Study the existing system of health care delivery

The organization of the system or process of care is reviewed by a team of professionals, which consists of representatives involved in each step of the given process of health care delivery. The members of the team should have between them all the necessary insight into this process of care. The team discusses their understanding of the process of care. By the end of this step, they draw a detailed flowchart or series of flowcharts to illustrate how the process of health care delivery is currently taking place.

2. At each step in the process of health care delivery, make explicit what, if any, clinical content is involved

The team goes through the process of health care delivery and at each relevant step makes explicit what clinical content pertains to this step. The clinical content can be in many forms: clinical definitions, criteria for diagnoses, criteria for referral, various clinical decision-making steps, treatment guidelines, etc. Most of these would be difficult to write down on the flowchart simply for lack of space. It is suggested that this clinical content information be included as appendices, which can be linked to specific steps in the process. The links can be made either by numbers and signs or by arranging the clinical content to follow the steps in the flowcharts. It is important to note those steps where it is not possible to agree on the clinical information, and why: either because it is not available or because different professionals use different criteria.

3. Review evidence-based literature on the subject matter of the clinical guideline

A literature review is conducted and evidence-based materials are prepared for a seminar to discuss subject matter for the clinical guideline. All of these materials are reviewed, starting with definitions and basic understandings and moving to the latest evidence-based materials on the subject matter. For the PIH clinical guidelines a team of high-level experts in the subject matter from the USA and Russia led this part of the development. Quality Assurance experts provided support to the content experts regarding the process of clinical guideline development and linking the clinical and organizational aspects of the new system of care.

4. Update the clinical content in accordance with the evidence-based knowledge of the subject matter

The project team returns to the current systems and processes and reviews them based on the clinical update discussed at the seminar. The objective of this step is to decide what clinical content needs to be changed or updated in order to make their new systems compatible with the state-of-the-art in the clinical care. Changes in clinical content are discussed and reviewed with regards to their understanding of the reality of the health care system. This is perhaps the most difficult part of the work, as it entails changes in physicians' practices of clinical medicine. For this reason, it is essential that the team consists of key staff, including the professionals who will be responsible for ensuring that the changes in clinical practice will get implemented. Therefore the team needs to include senior physicians, as well as general practitioners and other clinical staff including nurses and midwives, who are involved in the everyday delivery of health care. The team decides on what needs to be changed in the current clinical practices. Relevant instructions and orders may be issued.

5. Introduce changes to the system of care to enable the implementation of updated content knowledge

Simultaneously, as clinical changes are thought through, the organization of care is reviewed and changes in the organization of care are considered. The objective of the exercise is to change the existing system such that it will enable the implementation of the updated clinical content. This may seem straightforward on the surface. However, in reality, the extent to which the team is able to decide on what can and cannot be changed in the system of health care delivery is a far more complex set of decisions. Back and forth discussions and negotiations between the members of the team and the leadership are required for this purpose. By the end of this stage, new flowcharts are developed with accompanying appendices describing the updated clinical content.

6. Review the indicators to ensure that they reflect the changes in both subject matter knowledge and changes in the system of care

The clinical guidelines, as well as other components of the work, are implemented as an integral part of the process improvement. One component is the development of indicators of quality. These are a set of measurements that allow us to monitor the progress of the improvement project at the process, outputs, and outcomes levels. The indicators are chosen prior to the development of the updated clinical guidelines. However, once the new clinical guideline and system of care are decided on, the indicators need to be reviewed so that they reflect important changes in the new system of care and its clinical content.

4.4. Scope of Application and Purpose of the Guideline

The inclusive purpose of this clinical guideline is to improve medical care for women with pregnancy induced hypertensive disorders and streamline the organization of medical care delivery.

4.4.1. Clinical description of the guideline

Classification and Diagnostic Criteria

Hypertensive disorders during pregnancy are a major complication in obstetrical care worldwide. However, consensus has not been achieved on a uniform classification and definition for these conditions. For the purpose of this clinical guideline, the International Classification of Diseases – 10 (1992) has been chosen as the standard for classification.

The International Classification of Diseases – 10 (ICD-10) for edema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium (O10-O16) includes the following classifications outlined in Table 4.1. The focus of this clinical guideline covers the ICD 10 classifications – O13, O14, O15 and not O10, O11, O12, O14.9 and O15.9.

Table 4.1. ICD-10 Classification of Hypertensive Disorders of Pregnancy (O13-O15)

O13. Pregnancy induced hypertension without significant proteinuria Gestational hypertension NOS Mild pre-eclampsia
O14. Pregnancy induced hypertension with significant proteinuria O14.0 Moderate pre-eclampsia O14.1 Severe pre-eclampsia O14.9 Pre-eclampsia, unspecified
O15. Eclampsia O15.0 Eclampsia in pregnancy O15.1 Eclampsia in labor O15.2 Eclampsia in the puerperium O15.9 Eclampsia, unspecified as to the time period Eclampsia NOS

Table 4.2. Pregnancy Induced Hypertension Criteria (PIH) (ICD-10, O.13 – O.15)

Pregnancy induced hypertension without significant proteinuria (Mild pre-eclampsia (O13)	Arterial pressure > or = 140/90 mmHg but under 160/110 mmHg taken at rest at least 6 hours apart or increase of 30 mmHg in the systolic pressure or 15 mmHg in the diastolic pressure from the baseline (baseline blood pressure documented at < 16 weeks gestation) Proteinuria < 0.3 gm or < 1+ Edema - No hand and facial edema
Pregnancy induced hypertension with significant proteinuria (Moderate pre-eclampsia O14.0.)	Arterial pressure > or = 140/90 mmHg but under 160/110mmHg taken at rest at least 6 hours apart; or increase of 30 mmHg in the systolic pressure or 15 mmHg in the diastolic pressure from the baseline (baseline blood pressure documented at < 16 weeks gestation) Proteinuria > 0.3 gm but < 5 gm a day or 1+ to 2+. Edema – Hand and/or facial edema may or may not be present
Pregnancy induced hypertension with significant proteinuria (Severe pre-eclampsia O14.1)	Arterial pressure > or = 160/110 mmHg taken at rest at least 6 hours apart Proteinuria > or = 5 gm/24 hours or 3+ to 4+ Edema - Hand and/or facial edema may or may not be present
Eclampsia (O15.)	Occurrence of one or more convulsions/seizures in association with the syndrome pre-eclampsia

Conditions attributed to atypical toxemia forms, i.e. HELLP-syndrome and acute fatty hepatosis according to the Russian classification are also not within the scope of this clinical guideline. However, such conditions are characterized by high mortality rate and their manifestation in women with PIH requires urgent and proper actions.

The diagnostic criteria adapted for the ICD-10 PIH classifications used in this clinical guideline are outlined in Table 4.2. These diagnostic criteria are based on a review of the literature and synthesis of the most current clinical recommendations used in the United States (see References).

Blood Pressure Measurement

The accurate measurement of a woman's blood pressure is imperative to the correct diagnosis of PIH. It is recommended that a woman's blood pressure be measured in the sitting position using the appropriate cuff size. This measurement should be done again after at least 6 hours of rest. Per the Working Group Report on High Blood Pressure in Pregnancy (1990), the fifth Korotkoff sound (disappearance) is recorded as the diastolic blood pressure.

Magnesium Sulfate Treatment

There is conclusive evidenced-based support identifying magnesium sulfate as the drug of choice for treating eclampsia. Magnesium sulfate was more effective in treating eclampsia than phenytoin (4 good quality trials; 823 women) or diazepam (5 good quality trials; 1236 women). (Duley, L. et.al. The Cochrane Library, Issue 1, 2000. Oxford: Update Software; and Duley, 1995).

The use of intramuscular MgSO4 for prophylaxis treatment for eclampsia has been part of Russian clinical practice for about a century (Бровкин Д.П. Эклампсия – Москва 1948).

In the United States, the use of prophylactic MgSO4 treatment for pre-eclampsia, to prevent eclamptic seizures, has long been the standard of care. Clinical experience and controlled trials have guided this practice. The American College of Obstetrics and Gynecology includes prophylactic MgSO4 treatment in the ACOG Technical Bulletin: Hypertension in Pregnancy, Number 219-January, 1996.

This clinical guideline introduces the use of *intravenous* prophylactic MgSO4 treatment to prevent eclamptic seizures and treatment for eclampsia.

4.4.2. Target groups

The guideline is intended for the use in antenatal care of pregnant women with PIH, early identification and management of the various forms of PIH and postpartum management.

4.4.3. Guideline users

The guideline is designed for midwives, obstetricians/ gynecologists, anesthesiologists/resuscitators, and physicians. It may be used for health care delivery for pregnant women at all levels, starting from women's consultation clinics and up to maternity hospitals and departments. The guideline is the key issue for organization of the medical care delivery system for health care institutions of all levels.

4.4.4. Expected outcomes

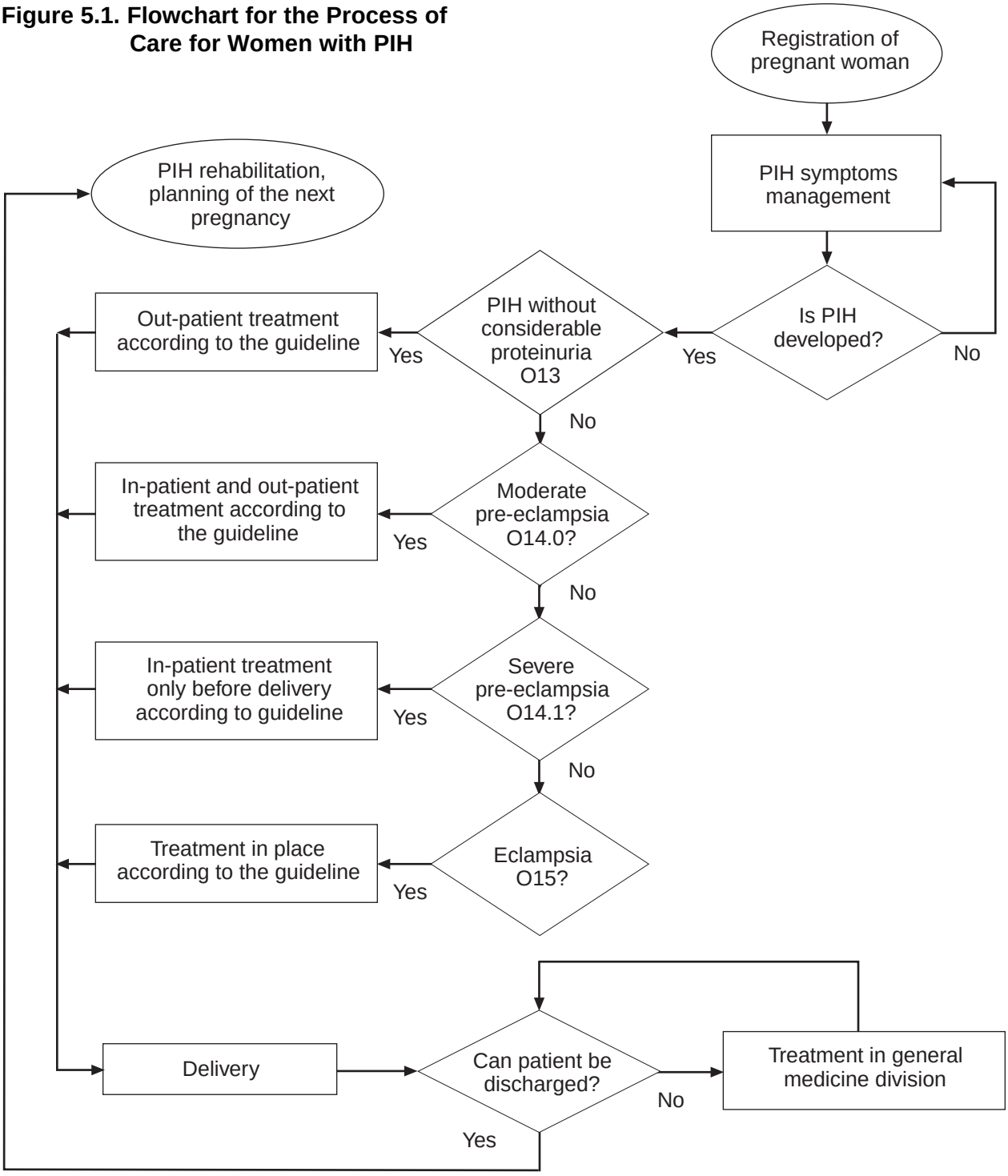
- A unified technological approach in Tver oblast to prevent, diagnose, treat and manage PIH
- Decrease in maternal morbidity and mortality for women diagnosed with PIH
- Decrease in early and late neonatal morbidity and mortality for infants born from women diagnosed with PIH
- Personnel training for the methods of continuous improvement of pregnant women's health care
- A unified understanding of quality medical care among all staff members
- Higher cost effectiveness and decrease in expenditures associated with PIH

5. System of Medical Care Organization at all levels and for all target groups

5.1. Flowchart for the Process of Care for Women with PIH

Flowchart indicating all stages of health care delivery for all forms of PIH severity is shown at Fig. 5.1. Detailed flowcharts are shown below at the respective items of section 6.

Figure 5.1. Flowchart for the Process of Care for Women with PIH



5.2. Description of the Process of Care

According to the guideline, medical care is provided for two groups of the female population: pregnant women with PIH and puerperae with PIH in postpartum. Thus, medical care delivery may be presented as the following consecutive phases:

1. Women's clinic
   - 1.1. Assessment of pregnant woman's condition, diagnosis
   - 1.2. Making a plan of examination and management of women with high-risk pregnancy, observation and pregnancy evaluation, decision on the choice of treatment tactics
   - 1.3. Treatment of mild PIH
2. Delivery department, maternity hospital
   - 2.1. Pregnancy pathology ward – treatment of severe PIH
   - 2.2. ICU and resuscitation department – treatment of eclampsia.
3. Post PIH rehabilitation in therapeutic department, common hospital, women's consultation clinic and pregnancy planning.

5.3. Provision for the Process of Health Care Delivery

5.3.1. Personnel

OB/GYN, midwife, ICU staff (24 hours a day), physicians in charge of resuscitation, neuropathologist, neonatologists, physicians-consultants (cardiologist, ophthalmologist), medical nurses, laboratory technicians and junior medical personnel.

5.3.2. Medications needed

Medications are shown in Table 5.1.

Table 5.1 Medications

	Women's Clinic	Pregnancy Pathology Ward	ICU/Resuscitation Unit
Polyvitamins	+	+	-
Folic acid	+	+	-
Iron preparations	+	+	-
Calcium gluconate tablets	+	+	-
25% Magnesium sulfate	-	+	+
5% Glucose solution	-	+	+
Ringer's-Lokk solution	-	+	+
10%Calcium Gluconate solution	-	+	+
Oxygen	-	-	+
Dexamethasone	-	+	+
Antihypertensive medications (Atenolol)	-	+	+
Phenytoin sodium or Diazepam	-	-	+
Prostaglandins	-	+	+
Oxytocin	-	+	+

5.3.3. Equipment Used in the Process of Health Care Delivery

Table 5.2. Equipment

	Women's Clinic	Pregnancy Pathology Ward	ICU/Resuscitation Unit
BP measuring device with a set of cuffs	+	+	+
Stethoscope	+	+	+
Fetoscope e.g. Pinard	+	+	+
Microperfuser	-	+	+
Tongue depressor	-	-	+
Oral Airway	-	+	+
Laryngoscope	-	-	+
Vacuum Suction equipment	-	-	+
Supply materials			
Intubation tubes and stilets	-	-	+
Adult Resuscitation set (Ambu bag, mask)	-	-	+
Foley catheters	-	-	+
Disposable needles	+	+	+
Disposable syringes	+	+	+
Disposable infusion system	-	+	+

6. Medical Care provided to women with Pregnancy Induced Hypertension at different stages of disease

6.1. Pregnancy Induced Hypertension Without Significant Proteinuria Mild Pre-eclampsia (ICD 10 – Î13)

6.1.1. Criteria

Blood pressure > or = 140/90mmHg and < 160/110 taken at rest at least 6 hours apart OR Increase in systolic by 30mmHg OR Increase in diastolic by 15mmHg over baseline blood pressure (baseline blood pressure documented at < 16 weeks)

Proteinuria < 0,3g or < 1+; Edema - No hand or facial edema

6.1.2. Outpatient Care:

Outpatient care is provided by obstetrician-gynecologist of a women's consultation clinic, midwife, and assigned physician at the outpatient clinic. If PIH without considerable proteinuria is registered for the first time at a paramedical/obstetric station, patient is referred to an ob/gyn of a women's consultation clinic. After consultation at the women's clinic a paramedical/obstetric station midwife or paramedic conducts further patient's observation according to the outlined below flowchart (if daily proteinuria control is available).

6.1.3. Outpatient Management: (*See* fig. 6.1.)

1. Provide official permission for absence from work for the pregnant woman

2. Patient taught to **self–monitor major PIH risk factors,** i.e. BP, edema, urinary protein, fetal kick count, daily diuresis

3. Patient taught **warning signs:** Return to the clinic or hospital immediately with the following signs or symptoms: Headache, visual changes, right upper quadrant or epigastric pain, sudden onset of facial or hand edema; decreased fetal kick count. Make sure the patient has **transport availability to get to the clinic or hospital.**

4. **Laboratory tests** for initial examinations include: urinalysis, hemoglobin, hematocrit, platelet count, liver functions, plasma creatinine, 24 hour urinary protein and creatinine clearance, nonstress test (if available)

5. Further observation and management include:

   5.1 Protective regime

   ❖ limited physical and psychological stress

   ❖ left side position during rest time – minimum 1 hour 3 times per day

   ❖ corrective positioning (2 hours/day) with position rotating

      1. right/left side position

      2. knee/elbow position

   5.2 **Adequate protein and fluids** with no fluid or salt restriction, no thirst provocative food

   5.3. **Continue prenatal vitamins,** iron and consider calcium (2g/day)

   No drug therapy of diuretics, antihypertensives or sedatives should be given

   5.4. **Visit schedule:** Return to clinic every 3 days

   Monitor every visit:

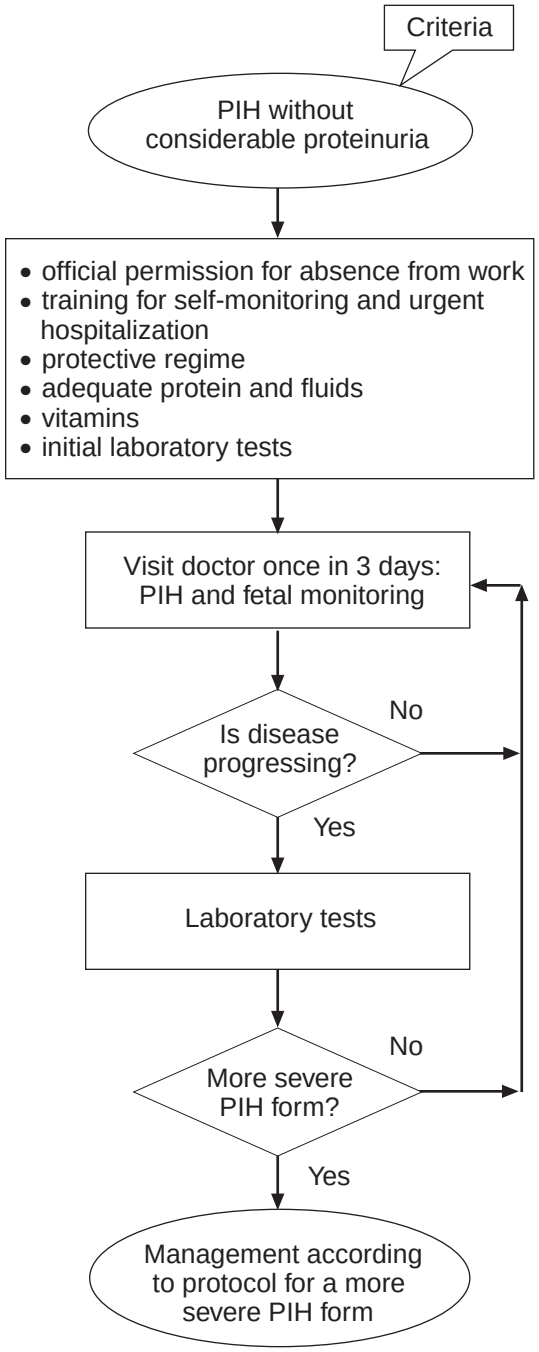
   ❖ Ask for patient's complaints, conduct total clinical examination (especially liver palpation, deep tendon reflexes, clonus, edema)

   ❖ BP, urinary protein, if protein is found – 24 hr proteinuria, platelet count (once a week)

   ❖ Fetal surveillance: Fetal growth (implicitly) by measuring height of the fundus of the uterus and abdomen circumference; Fetal kick count; Amniotic fluid index and biophysical profile (if available);

   ❖ Nonstress test (if electronic fetal monitoring is available)

Fig. 6.1. Flowchart of the Process of Care for Women with PIH without considerable proteinuria



6.1.4. Criteria for switching over to flowchart of the process of care for women with a more severe PIH form:

A more severe PIH form is diagnosed if there are changes in any of the classification signs, which indicate a progressing disease.

6.2. Pregnancy Induced Hypertension with significant Proteinuria Moderate Pre-eclampsia (ICD 10 - O.14.0)

6.2.1. Criteria:

Blood pressure > or = 140/90 and < 160/110 taken at rest at least 6 hours apart OR increase in systolic by 30mmHg OR increase in diastolic by 15mmHg over baseline blood pressure (baseline blood pressure documented at <16 weeks)

Proteinuria > 0.3g and < 5 g/24 hours or 1+ to 2+.

Edema – Hand and/or facial edema may or may not be present

6.2.2. Outpatient and in-patient care. Medical care providers

Moderate pre–eclampsia diagnosed remote from a term gestational age of the fetus (< 37 weeks) can be managed on the **outpatient** basis given systematic medical observation **or at a day care clinic** with frequent fetal surveillance and monitoring for progression of disease (daily or every 2 days).

If the patient is unable to visit her doctor daily or once in two days (lives in a remote area, family reasons), she is offered **hospitalization** (*See* Refer for hospitalization with the following findings: para 6.2.4.). If the woman refuses hospitalization - active management is conducted **at the patient's home** (home care hospital) by the physician from the women's clinic.

Patient with PIH with considerable proteinuria (Moderate pre-eclampsia) is managed on the outpatient basis **only at a women's consultation clinic** with a midwife or an assigned physician. If PIH with considerable proteinuria is registered for the first time at a paramedical/obstetric station, the patient is immediately referred to an ob/gyn of a women's consultation clinic.

Moderate pre–eclampsia diagnosed at a term gestational age (≥37 weeks) of the fetus mandates referral to a second level hospital. Moderate pre–eclampsia diagnosed at a preterm gestational age (<37 weeks) of the fetus mandates referral to a third level hospital.

Inpatient medical care is provided by an obstetrician-gynecologist, physician, anesthesiologist, resuscitator, neonatologist, ophthalmologist, midwife trained in midwifery/nursery care for MgSO4 treatment protocol.

Flowchart of care for women with PIH with considerable proteinuria is shown at fig. 6.2.

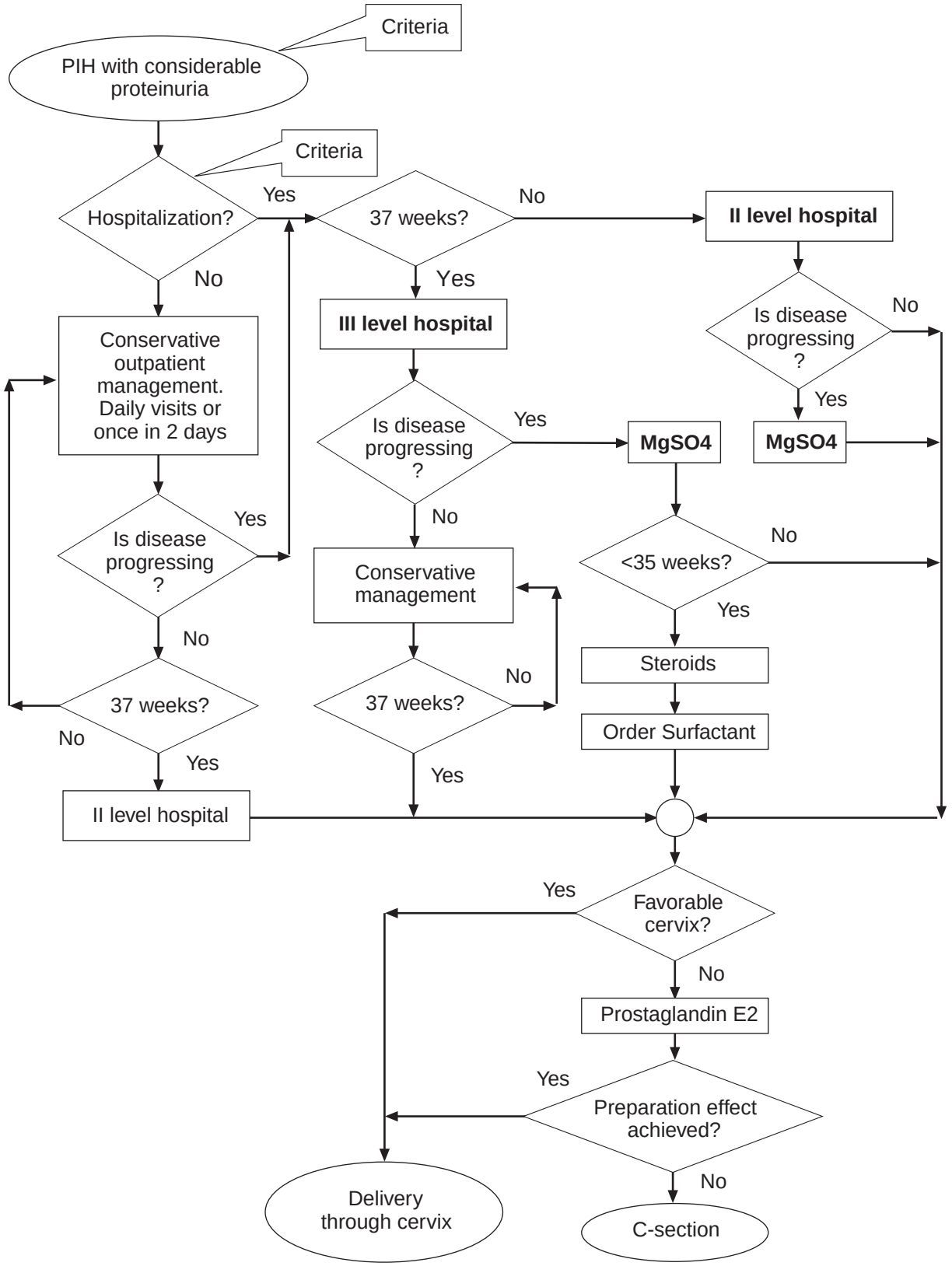
6.2.3. Outpatient Management

1. Determine **gestational age of fetus**
2. Provide **official permission for absence from work** for the pregnant woman with diagnosed PIH
3. Patient taught **to self-monitor major PIH risk factors,** i.e. BP, edema, urinary protein, fetal kick count, daily diuresis
4. Patient taught **warning signs:** Return to the clinic or hospital immediately with the following signs or symptoms: headache, visual changes, right upper quadrant or epigastric pain, sudden onset of facial or hand edema; decreased fetal kick count. Make sure the patient has **transport availability to get to the clinic or hospital**
5. **Reserve bed** for this patient at the hospital of a high level. Urgent hospitalization at the II level hospital if < 37 weeks and routine hospitalization at a III level hospital if ≥37 weeks
6. **Laboratory tests:** urinalysis, hemoglobin, hematocrit, platelet count, liver functions, plasma creatinine, 24 hour urinary protein and creatinine clearance, nonstress test
7. **Further observation and management include:**

   7.1. Protective regime

   - ✥ limited physical and psychological activity.
   - ✥ left side position during rest time – minimum 1 hour 3 times per day

Fig. 6.2. Flowchart of the Process of Care for Women with PIH with considerable proteinuria



- ✥ corrective positioning (2 hours/day) with position rotating
  1. right/left side position
  2. knee/elbow position

7.2. Adequate protein and fluids **with no fluid or salt restriction, non-thirst provocative food**

7.3. Continue prenatal vitamins; **iron and calcium (2g/day) if indicated**

7.4. No antihypertensive therapy **in case BP is within the clinical norm. No therapy of diuretics, antihypertensives or sedatives should be given**

7.5. Visit schedule: **Return to clinic every 1-2 days**

Monitor every visit**:**

- ✥ Ask for patient's complaints, conduct total clinical examination (especially liver palpation, deep tendon reflexes, clonus, edema)
- ✥ BP, urinary protein, if protein is found – 24 hr proteinuria, platelet count
- ✥ Fetal surveillance: Fetal growth (implicitly) by measuring height of the fundus of the uterus and abdomen circumference; Fetal kick count; Amniotic fluid index and biophysical profile (if available);
- ✥ Nonstress test (if electronic fetal monitoring is available)

6.2.4. Refer for hospitalization with the following findings:

1. Diagnosis of moderate pre-eclampsia at term (≥37) gestational age of fetus (II level hospital)
2. Diagnosis of moderate pre-eclampsia at preterm (<37) with persistent hypertension, persistent proteinuria, abnormal laboratory tests (III level hospital)
3. Factors hampering immediate hospitalization, i.e. long distance, social conditions
4. Non-reassuring fetal status of severe growth restriction or intrauterine growth retardation, decreasing amniotic fluid index (if available), decreasing fetal kick count results or poor electronic fetal monitoring testing results (if available).
5. **Immediate hospitalization is required in case of any of the following symptoms: headache, visual disturbances or right upper quadrant/ epigastric pain; sudden onset of facial or hand edema; decreased fetal kick count.**

6.2.5. Inpatient care (Conservative)

1. **At admission:**
   - 1.1. Determine **gestational age of fetus**
   - 1.2. **Laboratory tests** when initially hospitalized include: urinalysis and 24 hour urine for protein and creatinine clearance; hemoglobin, hematocrit, & platelet count; liver functions; biochemistry including plasma creatinine; fibrinogen and fibrin degradation products, eyegrounds examination, nonstress test (if available).
2. **Protective regime**
   - ✥ reduced physical and psychological stress
   - ✥ left side position during rest time – minimum 1 hour 3 times per day
   - ✥ corrective positioning (2 hours/day) with position rotating

     right/left side position

     knee/elbow position
3. Adequate protein and fluids **with no fluid or salt restriction, non-thirst provocative food**
4. Continue prenatal vitamins, **iron and calcium (2g/day) if indicated**
5. **No antihypertensive therapy** in case BP is within the clinical norm . No therapy of diuretics, antihypertensives or sedatives should be given
6. If BP is 160/110 or higher, one of the following antihypertensive medications is indicated (atenolol, methyldopa, anapriline). Steroid treatment if gestation is < 35-36 weeks (See RDS guidelines para 6.3.3.)
7. **Laboratory tests**
   - ✥ **Monitor BP** every 6 hours
   - ✥ **Repeat a urinalysis daily**

- ❖ Repeat the following laboratory tests every 3 days: hemoglobin, hematocrit, & platelet count; liver functions; and plasma creatinine.
- ❖ Fetal surveillance (daily): Fetal growth (implicitly) by measuring height of the fuondus of the uterus and abdomen circumference ; Fetal kick count; Amniotic fluid index and biophysical profile (if available);
- ❖ Nonstress test if daily fetal surveillance results are worsening and obligatory before delivery (if electronic fetal monitoring is available)
- ❖ Auscultation of FHR every 4 hours

6.2.6. Management of women with PIH with considerable proteinuria, moderate pre-eclampsia

Further management of women with PIH with considerable proteinuria, moderate pre-eclampsia depends on the severity of the disease, age of gestation and condition of the cervix.

1. Women with a pre-term fetus (<37 weeks) and unfavorable cervix, who are hospitalized and diagnosed with moderate pre-eclampsia, but remain stable, (without increasing hypertension or increasing proteinuria, normal laboratory tests, continued fetal growth and adequate amniotic fluid volume (if available), adequate fetal kick counts, and no maternal symptoms of headache, visual disturbances or epigastric pain) are conservatively managed as outlined above (*See* para 6.2.3. and 6.2.5.).
2. With the status outlined above in item 1 and 37 weeks of gestation pregnant woman is routinely hospitalized at a II level hospital with the follow up delivery.
3. If there are signssings of progressing disease and unreliable fetal status and if < 37 weeks of gestation (III level hospital)
   - ❖ Prophylactic MgSO4 treatment is indicated (*See* para 6.3.4.)
   - ❖ Simultaneously begin prophylactic MgSO4 treatment and steroid treatment to facilitate fetal lung maturity if < 35 weeks gestation
   - ❖ In case of unfavorable cervix prostaglandin E2 is indicated to prepare induction of labor
4. If there are signs of progressing disease and unreliable fetal status and if ³37 weeks of gestation (II level hospital)
   - ❖ Prophylactic MgSO4 treatment is indicated (*See* para 6.3.4.)
   - ❖ Induction of labor in case of favorable cervix and
   - ❖ Prostaglandin E2 is indicated to prepare induction of labor in case of unfavorable cervix
5. Delivery route (any term of gestation) is determined by cervix condition. Consider C section if preparation by prostaglandin gave no results.
6. Abstain from administrating magnesium sulfate in labor if condition is stable and BP is within the limits of moderate pre-eclampsia

   In case of unstable BP or BP values remaining at the maximal level of moderate pre-eclampsia values or condition worsening towards severe pre-eclampsia start magnesium sulfate therapy in labor to prevent eclamptic seizures (See para. 6.3.4.)

6.2.7. Criteria for switching over to flowchart of the process of care for women with a more sever PIH form

If any of the symptoms gets worse, i.e. persistent hypertension, headache, visual disturbances, right upper quadrant or epigastric pain, evidence of renal or liver damage or failure; oliguria < 25 ml/hour, falling platelets or disseminated intravascular coagulation, HELLP syndrome, severe pre-eclampsia, imminent or actual eclampsia, then severe pre-eclampsia is diagnosed and managed further on according to the PIH Treatment protocol with severe pre-eclampsia.

6.3. Pregnancy Induced Hypertension with Significant Proteinuria Severe Pre-eclampsia (ICD 10 –O14.1)

6.3.1. Criteria

Blood pressure > or =160/110 taken at rest at least 6

hours apart Proteinuria > or = 5 g/24 hours or 3+ to 4+

Edema – Hand and/or facial edema may or may not be present

6.3.2. Hospitalization and Delivery

Mandatory hospitalization at a III level hospital. Medical care is provided by the obstetrician-gynecologist of a third level hospital; anesthesiologist; neonatologist; assigned physician; Midwifery/ Nursing Care is provided by a midwife trained in midwifery/nursing care for pre-eclampsia, eclampsia and MgSO4 treatment protocol.

6.3.3. PIH Treatment Protocol with severe pre-eclampsia (014.1)

The main objective is delivery. At the time of hospitalization start prophylactic MgSO4 intravenous treatment, intensive observation and delivery preparation. ICU, midwifery observation around the clock, MgSO4 therapy (*See* para 6.3.4.).

1. At admission:

   1.1. Determine **gestational age of fetus**

   1.2. **Laboratory tests** when initially hospitalized include: urinalysis and 24 hour urine for protein and creatinine clearance; hemoglobin, hematocrit, & platelet count; liver functions; biochemistry including plasma creatinine; fibrinogen and fibrin degradation products, and eyegrounds examination. Nonstress test.

   1.3. Therapist and ophthalmologist consultation if indicated.

   1.4. Determine the follow up route and priority of actions.

2. Protective regime

   - Abolished physical and psychological stress.
   - Left side position; alternate with right side as needed.

3. **Adequate protein and fluids** with no fluid or salt restriction, non-thirst provocative food
4. **Continue prenatal vitamins,** iron and calcium (2g/day)
5. **No antihypertensive therapy** in case BP is within the clinical norm. No therapy of diuretics, or sedatives should be given.
6. If BP is 160/110 or higher, one of the following antihypertensive medications is indicated (atenolol, methyldopa, anapriline). **Infusion therapy:** maintain total fluid intake at 2500 to 3000ml in 24 hours including MgSO4 solution. Use 5 % Glucose solution.
7. Steroid treatment is indicated for all pregnant women with < 35-36 weeks gestation (with the exception of an imminent delivery) to facilitate fetal lung maturity. Dexamethasone (6 mg, intramuscular in 24 hours, 4 doses) Order and provide for surfactant delivery.
8. Call the resuscitation team and consider surfactant administration and transportation to the neonatal center if gestation age is < 35
9. Cervix preparation (*See* Delivery para 6.3.5)
10. Hourly diuresis control by an indwelling Foley catheter; proteinuria twice a day
11. Laboratory tests include: Complete blood count - once in 2 days (Hemoglobin, hematocrit, platelet count), blood protein, blood sugar, urea, creatinine, transaminase and electrolytes, fibrinogen, prothrombin and partial prothrombin times, fibrin degradation products; creatinine clearance and urinalysis - daily.
12. Therapist, neuropathologist and ophthalmologist consultations if indicated.
13. Fetal surveillance: Fetal growth (implicitly) by measuring height of the fundus of the uterus and abdomen circumference
14. Fetal kick count; Fetal HR, Amniotic fluid index and biochemical profile (if available)
15. Nonstress test if daily fetal surveillance results are worsening and obligatory before delivery (if electronic fetal monitoring is available)
16. Auscultate the FHR every 15 minutes with the MgSO4 loading dose and at least every hour during intravenous MgSO4 treatment.
17. Auscultation every 15 minutes to 30 minutes in labor. Continuous electronic fetal monitoring is recommended when available.

6.3.4. Magnesium Sulfate Intravenous Treatment

Magnesium sulfate intravenous treatment is started at the time of hospitalization.

Magnesium sulfate (MgSO4) IV treatment is prescribed as a dosage per hour continuous intravenous infusion given via an auxiliary drop-by-drop intravenous infusion line Objective of the therapy is to maintain desired serum Mg level in the patient's blood to prevent seizures.

1. **Initial Loading dose:** Initial loading dose is 4 grams (16 ml of 25% MgSO4 solution) is administrated very slowly by a syringe over 15–20 minutes. 1ml/min administration by perfuser is preferable. Considering the fact that highly concentrated MgSO4 solution may cause considerable irritation in walls of the vein, chosen for infusion (up to necrosis), we suggest that the MgSO4 initial loading dose should be dissolved into 5% Glucose solution or Ringer's–Lokk solution. To blend this solution one takes a sterile vessel with 34 ml of Ringer's–Lokk solution or 5% Glucose solution and adds 4 g of MgSO4 (16 ml of 25% solution). The infusion rate is 50 drops per minute. Overall infusion time equals to 20 minutes.
2. To Monitor:

   2.1. Loading dose: BP, pulse, RR (must be >12), HR, deep tendon reflexes during the first 15 minutes. Auscultate the FHR during the first 15 minutes with the MgSO4 loading dose. Fetal monitoring (if available).

   2.2. If patient is lying on her side, check blood pressure on upper arm at level of heart.
3. Maintenance Dose: The standard initial maintenance dose is 1 gram per hour. The maintenance dose range is 1 to 3 grams of MgSO4. Begin the MgSO4 maintenance dose at 1 gram per hour. Increase the dose further on up to 3 g on the basis of clinical indications.
4. The maintenance dose is increased based on the serum Mg levels and/or signs of persistent hyperreflexia. The maintenance dose is decreased or discontinued with clinical signs of Mg toxicity. Mg toxicity symptoms are: RR< 12, absent patellar reflexes, and maternal somnolence The therapeutic Mg level (4 to 8 mg/l) is determined by a serum Mg level every 4 to 6 hours. The maintenance dose is increased or decreased as needed based on the Mg level. If a facility cannot obtain serum Mg levels, the maintenance MgSO4 dose must be solely monitored by clinical signs Hourly evaluation for clinical signs and symptoms of Mg toxicity must be documented.
5. **MgSO4 Toxicity: Calcium gluconate 1 gram (10 ml of 10% solution)** is kept at the bedside. Stop the MgSO4 infusion and give Calcium gluconate 1 gram IV push as clinically indicated to reverse Mg toxicity.
6. MgSO4 Solution Preparation. To blend this solution take 7.5 grams (30 ml) of 25% MgSO4 and add it to 220 ml of Ringer's–Lokk solution or 5% Glucose solution. MgSO4 solution is ALWAYS given via an auxiliary line. The corresponding drip rates for each dosage of MgSO4 are listed in Table 6.1.

   Note: **When doing MgSO4 drop infusion, beware that different IV infusion systems administer different drip rates per milliliter. Be certain of the facility IV infusion system drip rate equivalence in milliliters that will be used for the intravenous MgSO4 infusion. The drip rates given below are based on an intravenous infusion system in which 20 drops = 1 milliliter.**
7. MgSO4 solution must be administered along with all the other solutions needed for infusion therapy. Maintain total fluid intake at 75ml to 125ml per hour (2500 to 3000ml in 24 hours including MgSO4 solution).
8. The procedure is carried out with the help of two vessels (one containing 250 ml of MgSO4 solution, the other holding infusion medium, i.e. 5% Glucose solution, Ringer's Lokk solution or physiological solution, two droppers, linked by connector or needle with mainline being infusion medium line and MgSO4 line falling into it but not vice versa. It is performed to achieve more accurate dosage and prevent errors in dose and infusion rate.
9. Monitor:

   9.1 Maintenance dose: Every hour assess and

Table 6.1. MgSO4 Infusion Rate

MgSO4 Solution Preparation: 7.5 grams (30 ml) of 25% MgSO4 added to 220 ml of Ringer's-Lokk solution or 5% Glucose solution. **IV drip rate: 20 drops = 1 milliliter**		
MgSO4 dosage in grams/hour	**ml/hour**	**Infusion Rate**
1 gram/hour	33.33 ml/hour	11 drops per minute
1.5 grams/hour	50 ml/hour	16 to 17 drops per minute
2 grams/hour	66.66 ml/hour	22 drops per minute
3 grams/hour	100 ml/hour	33 drops per minute
4 grams/hour	133.33 ml/hour	44 drops per minute

Note: MgSO4 infusion rate may vary from 1g/hr – 10-11 drops per minute to 2 g/hr – 20-22 drops per minute depending on the patient's condition.

document BP, pulse, respiratory rate (must be > 12), deep tendon reflexes and clonus, intake and output;

9.2. Maternal symptoms: headache, visual changes (blurred vision or scotomata), epigastric pain, changes in level of consciousness; Maternal signs/symptoms of pulmonary edema: tightness in chest, shortness of breath, shallow or rapid respirations, wheezing, cough - with or without frothy sputum, tachycardia.

9.3. Fetal surveillance: – auscultate the FHR at least every hour during intravenous MgSO4 treatment.

9.4. Auscultation every 15 minutes to 30 minutes in labor. Continuous electronic fetal monitoring is recommended when available.

10. Continue preventive measures (magnesium therapy according to severe PIH protocol) for 24 to 48 hours after the delivery together with symptomatic treatment.

6.3.5. Delivery Preparation/ Induction of Labor

1. Anesthesia choice – epidural anesthesia
2. Amniotomy is conducted when cervical preparation is completed. Oxytocin induction is started if labor does not begin within 2-3 hours.
3. Women with unfavorable cervix are indicated prostaglandin E2 to prepare induction of labor.
4. In case of a term gestation the induction of labor is prepared by prostaglandin E2 within 2 days and delivery is performed with regard to the obstetric situation, basically through cervix. Consider Cesarean section as a possibility.
5. Cesarean section is reserved for a worsening disease process that is remote from delivery and/ or fetal or maternal indications (Remember that women under magnesium treatment are predisposed for excessive bleeding after labor). Oxytocin IV at the postpartum period after fetal extraction.
6. Active management of the third stage with oxytocin IV. Ergotomine derivatives are avoided as these can raise the blood pressure.

6.4. Eclampsia (ICD 10 – 015)

6.4.1. Criteria:

Convulsions/seizures in association with PIH of all forms

6.4.2. Hospitalization and medical care providers

In case of eclamptic seizure, MgSO4 treatment is started immediately. ICU is a must. The obstetrician-gynecologist of the maternity hospital conducts urgent activities; anesthesiologist; neonatologist; and midwife trained in midwifery/nursing care for pre-eclampsia, eclampsia and MgSO4 treatment protocol.

6.4.3. Treatment of Eclampsia (ICD 10 – 015)

Delivery under epidural anesthesia with narcotics or sedatives (forceps or Cesarean section)

Goals:

- ✥ Control hypertension
- ✥ Correct hypoxia and acidosis
- ✥ Control blood pressure
- ✥ Delivery after convulsions discontinued.

Consider prophylactic MgSO4 for all women with PIH at risk for eclamptic seizures. (Chronic hypertension with superimposed PIH, women with symptoms of headache, visual disturbances, epigastric or right upper quadrant pain, oliguria, HELLP syndrome, and BP persistently > 160/110).

Hospital Care

1. Stabilize the patient, left side position, free airways, O2
2. IV access; give intravenous MgS04 loading dose as outlined below
3. Protect the patient from injury
4. Strict intake and output (indwelling Foley catheter)
5. Avoid unnecessary patient agitation (bright lights and loud noises)
6. Do not attempt to shorten or abolish convulsions. Minimize risk of aspiration by using mouth dilator, tongue depressor and evacuation of mouth contents.
7. Provide for oxygenation if seizures discontinue
8. If aspiration is suspected - chest x-ray
9. **Begin Magnesium Sulfate Intravenous Treatment**

   9.1. Start the appropriate mainline intravenous infusion and prepare the MgSO4 solution (*See* 6.2.5)

   Loading dose: 4 grams (16 ml of 25% $MgSO_4$ solution) is administrated very slowly by a syringe within 15–20 minutes. 1ml/min administration by perfuser is preferable. (*See* para 6.2.5.)

   9.2. **Initial Maintenance dose:** 1 gram/hour IV. Maintenance dose range: 1 to 3 grams/hour (See para 6.3.4)

   9.3. **If convulsions continue:** give another 2 gram bolus of MgSO4 (8 ml of 25% solution) IV over 3 to 5 minutes. Only if seizures continue after a second dose of MgSO4, then Diazepam (10 mg IV) or Tiopental (50 mg) may be used as an additional bolus. However, maintain the patient's airways free

   9.4. **Maintenance dose:** The standard initial maintenance dose is 1 gram per hour. The maintenance dose range is 1 to 3 grams of MgSO4 to reach a therapeutic Mg level. Begin the MgSO4 maintenance dose at 1 gram per hour. The therapeutic Mg level is determined by a serum Mg level every 4 to 6 hours. The maintenance dose is increased or decreased as needed based on the serum Mg level.

   9.5. **If a facility cannot obtain serum Mg levels,** the maintenance MgSO4 dose must be solely monitored by clinical signs. Remember that the maintenance MgSO4 dose is discontinued with clinical signs of toxicity.

   Caution must be used when increasing the maintenance dose if the facility cannot determine serum Mg levels. Hourly evaluation for clinical signs and symptoms of Mg toxicity must be documented.

   9.6. Calcium gluconate 1 gram (10 ml of 10% solution) is kept at the bedside. Stop the MgSO4 infusion and give Calcium gluconate 1 gram IV push as clinically indicated to reverse Mg toxicity.
10. **Avoid polypharmacy** that may lead to respiratory depression.
11. Laboratory tests, neuropathologist's consultation - after seizures discontinued

12. **Laboratory tests:** complete blood count, (hemoglobin, hematocrit, platelet count), blood sugar and protein, urea, plasma creatinine, biochemistry, transaminase and electrolytes, fibrinogen, prothrombin and partial prothrombin times, fibrin degradation products, serum Mg level, Calcium level, blood type and coagulation, prothrombin index
13. **If convulsions persist,** consider addition of other anti-convulsant, Diazepam/Phenytoin (watch for respiratory distress). Lung Ventilation. Urgent delivery is indicated.
14. **Antihypertensive therapy** is indicated if BP >160/110. Maintain BP at <160/110 and >110/90 with an antihypertensive medication
15. **Assess fetal/uterine status** to determine proper route of delivery, amniotomy, oxytocin, and prostaglandin, C-section if imminent delivery is not required after patient stabilizes
16. **Regional anesthesia** favored over general anesthesia

Continue prophylaxis (magnesium therapy according to PIH protocol) for 48 hours postpartum and symptomatic treatment.

6.5. Treatment of Women Experiencing PIH in the Immediate Postpartum

1. MgSO4 treatment continues for 24 to 48 hours after delivery and is then discontinued.
2. Intensive observation for 24 to 48 hours after delivery during postpartum MgSO4 treatment.

   2.1. Bed rest until MgSO4 treatment is discontinued

   2.2. Balanced meals

   2.3. Corrective positioning as needed

   2.4. Continue Midwifery/Nursing Care protocol for Pre-eclampsia and MgSO4 treatment until MgSO4 is discontinued.

   2.5. Laboratory tests as needed: hemoglobin, hematocrit, platelet count, liver functions, plasma creatinine, serum Mg level

   2.6. Assist with breastfeeding (MgSO4 is NOT a contraindication to breastfeeding)
3. Routine postpartum care is given when MgSO4 treatment is discontinued (at 24 to 48 hours)
4. Patients who require antihypertensive medications on discharge should be evaluated weekly and a full medical evaluation considered if persistent hypertension at 6 weeks.
5. Counseling for postpartum contraception and breast feeding.

6.6. At Discharge from the Maternity Hospital

After discharge woman should be counseled on postpartum contraception and exclusive breastfeeding **Not fully stabilized patients are to be transferred to therapy department.**

Health care providers are: obstetrician-gynecologist of the maternity hospital, assigned physician.

6.7. After Discharge

1. Rehabilitation at women's consultation clinic.
2. Women who do NOT need antihypertensive medication on discharge from the hospital should receive routine postpartum care. They should be evaluated at the regular examination at 6 weeks postpartum.
3. Women who require antihypertensive medications on discharge from the hospital should be evaluated weekly at the women's consultation with laboratory tests for proteinuria and serum creatinine. If the hypertension is persistent, the patient should be closely followed up on an outpatient basis. The patient may be hospitalized for further examination and selection of treatment only when such care is impossible on an outpatient basis.

Outpatient care is provided by the obstetrician-gynecologist of the women's clinic and assigned physician.

6.8. Midwifery/Nursing Care Protocol with Pre-eclampsia and MgSO4 Treatment.

1. Bedside Care and Physical Environment

- ❖ One-to-one midwifery care
- ❖ Quiet, darkened room to decrease central nervous system stimulation
- ❖ Padded bed and/or side rails to prevent injury with seizure
- ❖ Intubation tray including padded tongue depressor at bedside
- ❖ Calcium gluconate 1 gram (10 ml of 10% solution) at bedside
- ❖ Position patient on the left side - alternate with right side as needed
- ❖ If patient is lying on her side, check blood pressure on upper arm at level of heart
- ❖ Offer bedpan every 1 to 2 hours if indwelling Foley catheter is not available
- ❖ Provide positive environment, physical presence and verbal reassurance
- ❖ Provide supportive family presence
- ❖ Provide patient teaching regarding MgSO4 treatment, physical sensations and rationale for hourly assessment

2. Maternal Assessment and Documentation

2.1. Obtain maternal vital signs - Blood pressure, pulse and respiratory rate every 15 minutes during:

- ❖ Administration of MgSO4 loading dose infusion
- ❖ Increases in MgSO4 maintenance dose
- ❖ If maternal vital signs are unstable (BP < 90/50, pulse > 100 or < 60, respiratory rate < 12 or > 24, complaints of chest pain or shortness of breath)

2.2. Hourly assessment

- ❖ Blood pressure, pulse, respiratory rate
- ❖ Deep tendon reflexes and clonus
- ❖ intake and output
- ❖ maternal symptoms: headache, visual changes (blurred vision or scotomata), epigastric pain, change in level of consciousness
- ❖ maternal signs/symptoms of pulmonary edema: tightness in chest, shortness of breath, shallow or rapid respirations, wheezing, cough - with or without frothy sputum, tachycardia.

2.3. REPORTABLE FINDINGS

Notify the physician immediately if the following signs/symptoms are present

- ❖ Blood pressure

  Systolic > 160 mm Hg

  Diastolic > 110 mm Hg
- ❖ Respiratory rate < 12
- ❖ Urinary Output < 30 ml per hour
- ❖ Absent reflexes
- ❖ Headache, visual changes, epigastric pain
- ❖ Increasing reflexes, edema or proteinuria
- ❖ Symptoms of pulmonary edema
- ❖ Vaginal bleeding or uterine rigidity

3. Fetal Assessment and Documentation

3.1. Auscultate and document fetal heart rate and maternal vital signs every 15 minutes

3.1.1. If the MgSO4 maintenance dose is increased

3.1.2. If maternal vital signs are unstable (BP < 90/50, pulse > 100 or < 60, respiratory rate < 12 or > 24, complaints of chest pain or shortness of breath)

3.2. Auscultate and document fetal heart rate **every hour** during MgSO4 treatment

3.3. When patient is in labor and receiving MgSO4 treatment, auscultate and document fetal heart rate **every 15 to 30 minutes**

3.4. ***Notify the physician immediately if an abnormal fetal heart rate is auscultated.***

3.5. Electronic fetal monitoring is recommended if available.

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